WORKING DRAFT

FLATHEAD COUNTY TRANSPORTATION PLAN
PHASE II

PAVED VS. UNPAVED ROADWAYS
TECHNICAL MEMORANDUM

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Paved vs. Unpaved Roadways

The decision to pave a County roadway, or to leave it as gravel surfacing, is a function of several issues. In addition to the actual roadway capacity of paved versus unpaved facilities, other issues such as air quality, sediment, access restrictions, travel speeds and safety all can affect recommendations to pave a roadway.

Roadway Capacity

While there is no clear cut guidance on when to pave a gravel road, the average daily traffic volumes (ADT) used to justify paving the roadway generally range from 50 vehicles per day to 400 or 500 vehicles per day (Kentucky Transportation Center). When traffic exceeds 500 cars per day, the maintenance of the gravel road may become more costly and less effective than paving the road.

Air Quality

Under the Clean Air Act of 1970, EPA developed primary and secondary National Ambient Air Quality Standards (NAAQS) for seven criteria which include particulate matter and fine particulate matter. These standards establish pollution levels that cannot be exceeded. Monitoring devices have been placed at specific locations to measure specific airborne pollutants and to determine if standards are being exceeded. Montana has also adopted their own state air quality standards (MAAQS) to establish statewide standards of acceptable amounts of ambient air pollution.

The term fugitive dust refers to particulate matter (PM) consisting of very small liquid and solid particles that is suspended in the air by wind or human activities. Particles between 2.5 microns (PM-2.5) and 10 microns (PM-10) are usually associated with fugitive dust from wind-blown sand and dirt from roadways, field, and construction sites.

Areas that violate federal air quality standards are designated non-attainment areas. Montana has thirteen (13) official non-attainment areas and eleven (11) of these non-attainment areas are under state jurisdiction. Flathead County has three (3) of these non-attainment areas for particulate matter which are Kalispell, Columbia Falls and Whitefish.

By 2007, Flathead County received 53 dust complaints from unpaved roads since 1998, twice as many as any other county in the state. While paving a roadway would eliminate the fugitive dust emissions, this may not be a cost effective way to deal with the problem. Paving a low volume roadway is ultimately more expensive than simple good maintenance on a low volume

unpaved roadway. One way to reduce fugitive dust emissions is to lower speed limits on unpaved roadways. Another is the use of dust control stabilizers such as Calcium Chloride, Magnesium Chloride and Sodium Chloride however, if traffic volumes are too low, the cost of dust control can be prohibitive.

Sediment

Erosion along unpaved roadways can result in sediment being transportation into streams, channels and ditches. While paving the roadway will prevent sediment from entering the waterways, this may be more cost prohibitive then simple erosion control measures.

Access Restrictions

One way to reduce traffic and dust emissions from unpaved roadway is to restrict access to the roadway. In September of 2007 Flathead county commissioners passed an emergency resolution to allow them to close Prairie View Road after traffic had increased due to another road closure in the City of Kalispell. Again, this is a more cost effective resolution for low volume unpaved roadways than to simply pave the road.

Travel Speeds

Unpaved roads are intended to operate at low to moderate speeds. According to the American Association of State Highway and Transportation Officials (AASHTO) *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*, the design speed for unpaved roads should be 70km/h (45mph) or less, but may be as high as 80 km/h (50 mph) in appropriate situations. However, reducing speeds on unpaved roads to 25 mph will reduce fugitive dust emissions, erosion and increase safety.

Safety

There are no specific guidelines that indicate the maximum traffic volume level for which unpaved roads are appropriate. According to the American Association of State Highway and Transportation Officials (AASHTO) *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*, the safety of unpaved roads was researched in the NCHRP Report 362 and established that crash rates are generally higher for unpaved roads than paved roads for traffic volumes of 250 vehicles per day or more. The NCHRP Project 20-7(75) found that paving roads in rural areas that have a traffic volume ranging from 300 to 350 vehicles would be expected to result in one less severe crash every 10 to 15 years.

Rating System

Three of the issues discussed above were determined to be the most realistic parameters when deciding to pave a roadway. Maintenance cost and truck traffic should also be a consideration when determining whether or not to pave a roadway. Therefore, a rating system was developed using roadway capacity, travel speeds, safety, maintenance cost, and truck traffic as the criteria. The criteria should be weighted with the highest level of significance receiving the highest score. **Table 1** shows the points assigned for each of these criteria. A roadway that receives the highest number of points should be given the highest level of importance in determining whether or not to pave.

Table 1: Flathead County Rating System

Roadway Capacity (ADT):	**20**
< 50	0
51-200	5
201-350	10
351-500	15
>500	20
Travel Speeds (MPH):	**15**
>25	0
25-35	5
35-45	10
>45	15
Safety (accidents over 10 yr. period):	**15**
0	0
1-5	5
6-10	10
>11	15
Truck Traffic (%):	**5**
<2%	0
3-5%	3
>6%	5
Maintenance Cost (per mile):	**20**
>$1,000	0
$1,000 - $2,000	5
$2,000 - $3,000	10
$3,000 - $4,000	15
>$4,000	20